

# PATENT SPECIFICATION (11)

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## (54) MOULDED COMPOSITE MATERIALS

(71) We, WINSON LUXEMBURG N.V., a Luxembourg Company, of Coin Boulevard Royal et Grand-rue, Case Postale, 240 Luxembourg-Ville, Luxembourg, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a heat and pressure moulded composite material.

The accumulation of old tyres and waste resin products and containers has long presented an ecological problem with the non-biodegradable characteristic of such waste. Land fill area is rapidly disappearing, and many areas prohibit the burying of this tyre of waste, as well as the burning thereof.

Efforts have been made to combine reclaimed old tyres with asphalt and polyethylene to make improved road and play area surface (Johnson U.S. Patent No. 3,338,849). In Bollman, U.S. Patent No. 2,041,223, sulphur is added to arrive at an adhesive or coating composition for use on rubber shoes or other uses. In Popham U.S. Patent No. 2,392,691, rubber and/or reclaimed rubber is added to phenol, with the resin used directly as a bonding agent, or with the materials ground into a powder form with fillers and a hardening agent as a moulding composition. In Leydon U.S. Patent No. 2,593,681 plastics, synthetic rubber and rubber are combined with solvents to form a liquid useful as a coating. Dillhoefer U.S. Patent No. 3,386,925 teaches blends of reclaimed rubbers and plastics which can be fabricated by extrusion and injection moulding techniques.

I have found that a new and useful composite material may be moulded from reclaimed rubber tyres in particulate form and resinous plastics materials.

According to my invention, a heat and pressure moulded composite material comprises:

(a) rubber tyres in particulate form, including the fibrous cord content thereof but excluding any metallic content; and

(b) a lesser amount, by weight, of a particulate synthetic thermoplastic resin material;

the material being substantially heterogeneous and porous and containing an unmelted portion of the rubber tyre particles in bonded relationship with a set molten mixture of the resin material and the remainder of the tyre particles.

The porosity of the end product, as might be desired and/or imperative, in, for example, a minnow pail or a nurse pot container, is variable in proportion to the size of the rubber material bits and the relative amount, by weight, of these bits in the moulding material mixture.

In a preferred embodiment, the mixture of the present invention comprises, by weight, a mixture of between 50% and 80% of rubber tyre particles, preferably with particulate waste plastics materials such as various polymers, co-polymers, or plastics materials comprising glass fibres. The rubber tyre particles include the fibrous cord content of the tyres (generally not exceeding ten percent of the particulate tyre material), but exclude any metallic content thereof.

The term "rubber tyres" is intended to mean tyres formed of one or more of the following materials: natural rubber, polymers, interpolymers and copolymers of conjugated diolefins, i.e. polybutadiene, butadiene-styrene copolymers, butadiene-acrylonitrile copolymers, polymers and copolymers of methylpentadiene; polymeric forms of chlorine substitution products of conjugated diolefins, i.e. poly-chloroprene, polymers of non-conjugated systems, i.e. polyisobutylene and copolymers of isobutylene and isoprene, and condensation polymers of the polysulphide type.

If the two materials in the mix are to be blended cold, the chosen kind of waste plastics material is preferably refined so that its particle size is approximately the size of the rubber tyre particles with which it is mixed. If a banbury mixer, or other type of hot

mixer-blender, is used, the relative size of the particles is of less significance.

The porosity of the moulded composite material, using the above defined material mixture in a heat and pressure moulding process, is established in general by the relative amount of rubber material particles in the mix, as the size thereof. For example, a 50—50 rubber plastic mixture results in a composite material with very little porosity. An 80—20 rubber-plastic mixture results in a very porous material. Preferably, rubber tyre particles from 30 mesh size, where the mesh size is as specified in United States Federal Specification SS-C-192, Type I or II, up to  $\frac{3}{8}$ -inch screen mesh size are used. All of the rubber tyre that passes through the screen is used, except any metal, which would be magnetically separated.

Because of the insulating qualities of the rubber particles used and the potentially high porosity of the rubber particles (which again make it very insulative), the mould used for shaping the composite material may be modified from, for example, the same mould used for moulding plastics-only materials. Generally, a larger gate opening and travel paths for the resin or feed-stock to flow throughout the mould are needed. Because of the increase of substance in the rubber-plastics mixture, more flow paths may be created to assure material flow from one end of the mould to the other. Pressure would normally be increased from that used to mould plastics alone. These provisions are, however, but modifications to state of the art moulding technology as it applies to various and sundry plastics and fibreglass.

The resulting composite material, using the mixture herein has improved properties of resiliency, toughness, weight, and porosity as compared to moulded plastics products.

By control of heat, cooking time, pressure and other moulding process parameters, the moulded composite material may exhibit a selected degree of porosity and weight in comprising a reset, incompletely homogeneous, mixture of melted plastic-rubber blend bonded to rubber bits per se, and including gas-formed material voids therein. The resulting end products, including garbage can, nursery pots, buckets, fence posts,

and rail-road cross ties, in being made from such reclaimed waste materials, are obviously less expensive than currently used counterparts, while exhibiting, in many usages, improved strength, weight, resilience, and porosity characteristics.

#### WHAT WE CLAIM IS:—

1. A heat and pressure moulded composite material, comprising:

(a) rubber tyres in particulate form, including the fibrous cord content thereof but excluding any metallic content; and

(b) a less amount, by weight, of a particulate synthetic thermoplastic resin material;

the material being substantially heterogeneous and porous and containing an unmelted portion of the rubber tyre particles in bonded relationship with a set molten mixture of the resin material and the remainder of the tyre particles.

2. A composite material according to claim 1, wherein said resin material comprises waste including at least one of the materials polyethylene, polystyrene and polypropylene.

3. A composite material according to claim 1, wherein said resin material comprises fibreglass.

4. A composite material according to claim 2, comprising, in material cross section, a plurality of gas-formed voids between substantially contiguous wall surfaces.

5. A composite material according to any preceding claim, wherein said rubber tyre particles comprise, by weight, not less than 50 percent and not more than 80 percent of said mixture.

6. A composite material according to any preceding claim, wherein said rubber mesh as hereinbefore defined and three-eighths inch screen mesh.

7. A composite material according to any preceding claim, wherein the fibrous content of said rubber tyre particles comprises less than ten percent of said mixture weight.

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